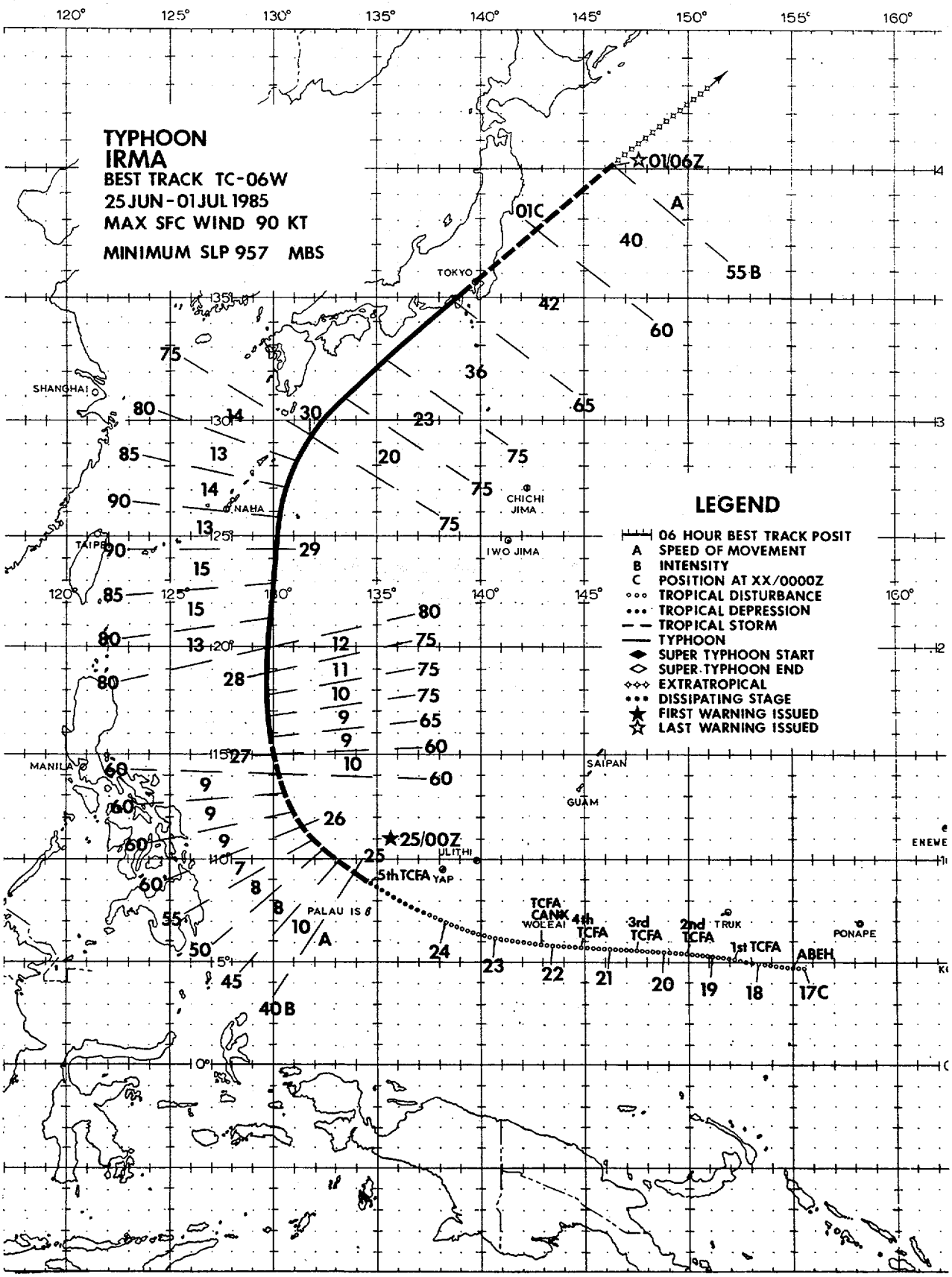
TYPHOON
IRMA
BEST TRACK TC-06W
25 JUN - 01 JUL 1985
MAX SFC WIND 90 KT
MINIMUM SLP 957 MBS
01/06Z
01C
TOKYO
SHANGHAI
NAHA
TAIPEI
CHICHI JIMA
IWO JIMA
MANILA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
25/00Z
5th TCFA
TCFA CANK
WOLEAI
4th TCFA
3rd TCFA
2nd TCFA
1st TCFA
TRUK
PONAPE
ABEH
17C
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

Although Typhoon Irma was not one of the more intense systems of the year, it became noteworthy due to the magnitude of property damage and loss of life it caused in the Philippines; and later, by passing directly over the Tokyo metropolitan area. It was the third significant tropical cyclone to develop in June within the monsoon trough and the first (in June) to recurve into the mid-latitude westerlies.

Typhoon Irma originated in the eastern extension of the monsoon trough in mid-June. It was slow to develop, taking eight days to become a tropical storm. At 0000Z on the 17th, the disturbance which later developed into Irma was located approximately 220 nm (407 km) southwest of Ponape (WMO 91348). Synoptic data showed a broad weak surface circulation with winds of 5 to 10 kt (3 to 5 m/s). Another disturbance, which would shortly develop into Typhoon Hal, was located to the northwest in the same trough 270 nm (500 km) east-southeast of Yap (WMO 91413). A broad surface ridge north of both disturbances dominated the northwest Pacific.

When the disturbance was initially mentioned on the 170600Z Significant Tropical Cyclone Advisory (ABEH PGTW), satellite imagery indicated that an upper-level cold low in the tropical upper-tropospheric trough (TUTT) was present northeast of Guam. This upper-level low, which was positioned 7 to 10 degrees of latitude north-northwest of Irma, was contributing to the upper-level diffluence and enhancing the convective activity in the vicinity of the disturbance. The potential for significant tropical cyclone development was evaluated as "fair" (meaning that issuing a TCFA during the advisory period was likely). By 0900Z on the 18th, the disturbance had moved west-northwest and was 150 nm (278 km) south-southeast of Truk (WMO 91334). Satellite imagery indicated the amount of convection was increasing and had more organization. Consequently, a TCFA on the system was issued at 181200Z and aircraft reconnaissance requested for the following day.

Over the next three days satellite imagery showed vigorous, but poorly organized, convection. The aircraft reconnaissance flight on the 19th of June at the 1500 ft (457 m) level was unable to locate a circulation center and reported a MSLP of 1006 mb. On the following day, aircraft reconnaissance found a surface circulation with a 5 nm (9 km) diameter area of light and varible surface winds, a drop in the MSLP of 4 millibars from the previous day and surface winds of 10 to 20 kt (5 to 10 m/s). The flow aloft over the disturbance was hampered by increased outflow from Hal to the west. During this period TCFAs were re-issued at 1200Z on the 19th through the 21st of June. Early on the 22nd, the convection within the disturbance became so suppressed that the TCFA was cancelled at 220500Z.

Unfavorable vertical shear from Hal hindered development of the disturbance until the 24th. The 241200Z synoptic data showed increasing southwesterly low-level flow entering the disturbance. This coincided with Typhoon Hal making landfall over southern China. Subsequent satellite imagery at 241600Z revealed a significant increase in the size of the central cloud mass. The fifth, and final, TCFA on this system followed at 241730Z.

With Hal weakening overland in mainland China, Irma now began to intensify in earnest. The first warning on the system was issued at 250143Z, after the Dvorak intensity analysis of the 250000Z satellite imagery showed the disturbance had increased to tropical storm intensity. Aircraft reconnaissance later in the day (250516Z) located a 994 mb circulation center with 45 kt (23 m/s) maximum surface winds 90 nm (167 km) east-northeast of the center.

The initial forecasts called for Irma to follow in Hal's footsteps up the monsoon trough into the South China Sea and around the subtropical ridge. Due to the uncertainty about the analysis over the data sparse Philippine Sea, 400 mb synoptic track aircraft missions were flown on 25 and 26 June to help define the mid-level flow to the north of Irma. These flights confirmed the presence of lower 400 mb heights in the ridge along 130E, which indicated the ridge would not steer Irma into the South China Seas as it had done with Hal. JTWC now forecast a more northward movement with eventual recurvature to the northeast. This forecast scenario proved correct.

Irma slowed slightly as it approached the end of the ridge at 130E longitude and continued to intensify. Early on the 27th, Irma attained typhoon intensity as verified by synoptic ship observations of 65 kt (33 m/s) north-northeast of the center and the Dvorak intensity analysis. For the next two days (Figure 3-06-1) Irma moved northward and reached a maximum intensity of 90 kt (46 m/s) with a MSLP of 957 mb at 290000Z.

Along with reaching maximum intensity, Irma also came under the influence of the mid-latitude westerlies. Within 24-hours, Irma was accelerating rapidly to the northeast headed for Tokyo and the

Kanto Plain area of Japan's Honshu Island. Simultaneously, the system began weakening and undergoing extratropical transition. Aircraft reconnaissance on the 30th indicated entrainment of the cooler, drier air into the system. The Aerial Reconnaissance Weather Officer (ARWO), at 300817Z, reported a 30 nm (56 km) elliptical eye with a slight tilt to the north-northeast.

By 010600Z, Irma had completed extratropical transition and the last warning was issued. The remains of Irma continued to move northeast toward the Kuril Islands where it merged with a complex low pressure area just south of the Kamchatka Peninsula.

In summary, as the Typhoon passed east of the Philippines on 28 and 29 June, heavy rains associated

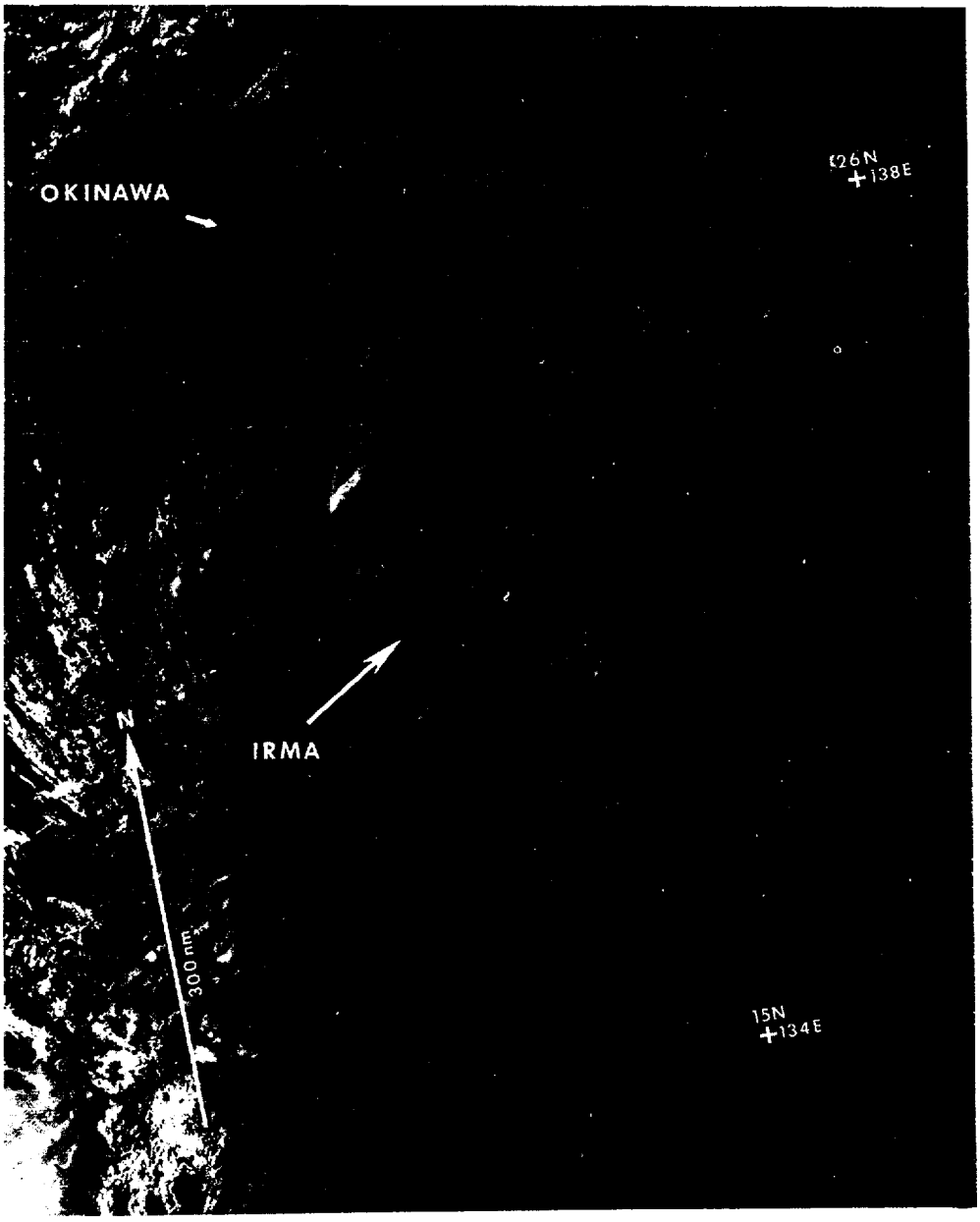

Figure 3-06-1. Irma, with maximum winds of 80 kt (41 m/s), nearing peak intensity south of Okinawa, Japan. (With the sun low in the west the cloud top topography is striking) (280931Z June DMSP visual imagery).

with the strong south westerly monsoon flow from the South China Sea across the island of Luzon produced more than 28 inches (711 mm) of rain. Flooding was widespread across areas of Manila and other sections of Luzon. At least 46 people perished in these floods; additionally, over 1,500 lost their homes. Later, when Irma made landfall on the southeastern tip of Honshu at 301800Z, maximum winds were estimated at 65 kt (33 m/s). The Naval Oceanography Command Facility at Yokosuka reported maximum winds of 51 kt (26 m/s) with a peak gust to 83 kt (43 m/s). The associated barograph trace is shown in Figure 3-06-2. Various military activities at Yokosuka reported minor damage and flooding, but no significant personal injuries. However, Japan police reported three deaths and five people were missing as a result of Irma. Twelve bridges were reported out, flood damage occurred to over 20,000 homes and power outages affected about 440,000 households.

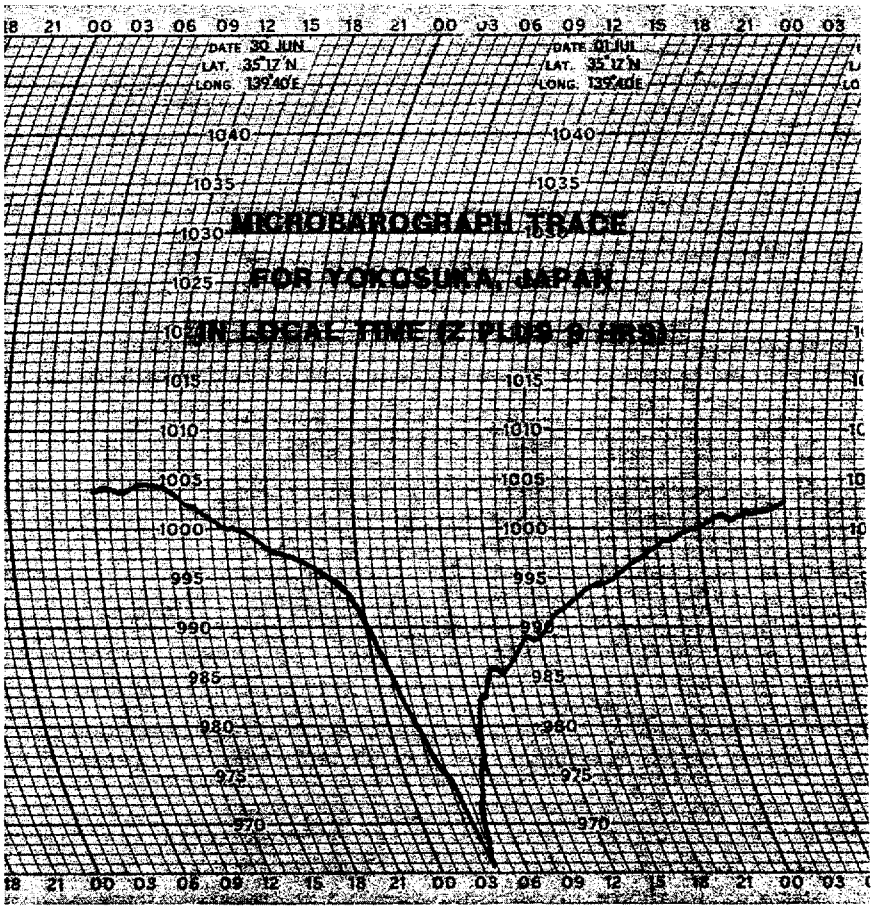

Figure 3-06-2. Barograph trace from the Naval Oceanography Command Facility in Yokosuka documenting Irma's passage over the Kanto Plain. The minimum sea-level pressure recorded was 963.3 mb at 301930Z.